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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* KENNETH O. MCELRATH, YUEMIE YANG and  
KENNETH A. SMITH

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Appeal 2008-5919  
Application 10/719,693  
Technology Center 2800

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Decided:<sup>1</sup> February 27, 2009

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Before BRADLEY R. GARRIS, TERRY J. OWENS, and  
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 CFR § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

## STATEMENT OF THE CASE

The Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1-10, which are all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

### *The Invention*

The Appellants claim an electron emitter comprising a carbon nanotube particulate. Claim 1 is illustrative:

1. An electron emitter comprising a carbon nanotube particulate on a surface wherein the carbon nanotube particulate comprises entangled small-diameter carbon nanotubes arranged in a three-dimensional network wherein the small-diameter nanotubes have an outer diameter in a range of about 0.5 nm and about 3 nm, wherein the carbon nanotube particulate has a cross-sectional dimension in a range of about 0.1 micron and about 100 microns.

### *The References*

Jin	6,250,984 B1	Jun. 26, 2001
Smalley	2002/0085968 A1	Jul. 4, 2002

### *The Rejection*

Claims 1-10 stand rejected under 35 U.S.C. § 103 over Smalley in view of Jin.

## OPINION

We affirm the Examiner's rejection.

The Appellants argue the claims as a group (Br. 3-6). We therefore limit our discussion to one claim in that group, i.e., claim 1, which is the sole independent claim. Dependent claims 2-10 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2007).

*Issue*

Have the Appellants shown reversible error in the Examiner's determination that the applied references would have rendered prima facie obvious, to one of ordinary skill in the art, an electron emitter comprising a carbon nanotube particulate that is on a surface, comprises nanotubes that are arranged in a three-dimensional network and have an outer diameter of about 0.5 nm to about 3 nm, and has a cross-sectional dimension of about 0.1 micron to about 100 microns?

*Findings of Fact*

Smalley discloses single-wall carbon nanotube ropes wherein the nanotubes have a diameter of 13.8 Å (1.38 nm) and a length of 0.1 up to 10, 100 or 1,000 microns, and the ropes comprise about 5 to 5,000 nanotubes (¶ 0088). The ropes may be collected as a tangled collection stuck together in a 10 mm<sup>2</sup> to 1,000 mm<sup>2</sup> or greater felt (¶ 0089).

Jin teaches: 1) "Carbon nanotubes feature a high aspect ratio (>1,000) and a small tip radii of curvature (~5-50 nm). These geometric characteristics, coupled with the high mechanical strength and chemical stability of the tubules, make carbon nanotubes attractive as electron field emitters" (col. 2, ll. 47-51), and 2) "Electron field emission is enhanced when the geometrical feature of the emitter is made small, due to the concentration of electrical field near sharp tips. Carbon nanotubes' small diameter, e.g., as small as 1.3 nm, provides an effective field concentrating feature" (col. 4, ll. 46-50).

*Analysis*

The Appellants argue that "[m]ats and felts are two out of many different nanotube structures disclosed by Smalley, and there is no

suggestion that these structures should or could be used as electron emitters” (Br. 5).

Because Smalley’s carbon nanotube ropes are the same or essentially the same as the Appellants’ carbon nanotube particulate in the form of ropes (claim 4), it appears that Smalley’s carbon nanotube ropes have the same properties as the Appellants’ nanotube ropes including the ability to function as an electron emitter. As stated in *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990), “when the PTO shows sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.” Moreover, Jin’s disclosure that carbon nanotubes are attractive as electron field emitters (col. 2, ll. 47-51; col. 4, ll. 46-50) indicates that the carbon nanotube ropes in Smalley’s felt are capable of functioning as electron emitters.

The Appellants argue (Br. 5):

Furthermore, the dimensions that the Examiner references in paragraph 88 of *Smalley* relate to ropes of nanotubes, as opposed to the felt in paragraph 89 which comprises a collection of multiple ropes stuck together in a mat. (See *Smalley* at paragraph 89, lines 1-4). Therefore, even if one could consider the felt of Smalley to be relevant to electron emitters, which *Smalley* plainly does not suggest, the dimensional range recited in claim 1 for the nanotube particulate would still not be satisfied by the felt of *Smalley*.

Smalley’s carbon nanotube rope diameter of 13.8 Å (1.38 nm) (¶ 0088) falls within the range of about 0.5 nm to about 3 nm required by the Appellants’ claim 1. The Examiner finds that Smalley’s carbon nanotube rope lengths of 0.1, 10 and 100 microns (¶ 0088), which fall within the cross-sectional dimension range of about 0.1 micron to about 100 microns recited in the Appellants’ claim 1, are a cross-sectional dimension (Ans. 3-

4), and the Appellants do not dispute that finding. Since the Examiner's finding is reasonable and the Appellants have not challenged it, we accept it as fact. See *In re Kunzmann*, 326 F.2d 424, 425 n.3 (CCPA 1964).

Moreover, when Smalley's carbon nanotube rope includes a number of carbon nanotubes near the low end of Smalley's range of about 5 to 5,000 carbon nanotubes (¶ 0088), the rope's width dimension can be within the 0.1 micron to about 100 micron range required by the Appellants' claim 1. As for the claim 1 requirement that the carbon nanotube particulate is on a surface, each carbon nanotube rope in Smalley's felt (¶ 0089) is on a surface comprising the other carbon nanotube ropes in the felt with which that carbon nanotube rope is tangled.

#### *Conclusion of Law*

The Appellants have not shown reversible error in the Examiner's determination that the applied references would have rendered prima facie obvious, to one of ordinary skill in the art, an electron emitter comprising a carbon nanotube particulate that is on a surface, comprises nanotubes that are arranged in a three-dimensional network and have an outer diameter of about 0.5 nm to about 3 nm, and has a cross-sectional dimension of about 0.1 micron to about 100 microns.

#### DECISION/ORDER

The rejection of claims 1-10 under 35 U.S.C. § 103 over Smalley in view of Jin is affirmed.

It is ordered that the Examiner's decision is affirmed.

Appeal 2008-5919  
Application 10/719,693

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

tc

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